



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,456	12/14/2001	Ebrahim Andideh	042390P13229	1704

7590 09/09/2004  
Michael A. Bernadicou  
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP  
Seventh Floor  
12400 Wilshire Boulevard  
Los Angeles, CA 90025-1026

EXAMINER
----------

VU, HUNG K

ART UNIT	PAPER NUMBER
----------	--------------

2811

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/022,456	<b>Applicant(s)</b> ANDIDEH, EBRAHIM	
	<b>Examiner</b> Hung K. Vu	<b>Art Unit</b> 2811	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 19-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 19-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Request for Continued Examination***

1 A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/06/04 has been entered. An action on the RCE follows.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-7 and 19-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not disclose thin films having thicknesses that are less than about 20.0% of critical dimension (CD) of features in devices. Note that the specification only disclose, at section [0013], that multilayer stack 250 of thin films includes a thin film 220 and that the thin

Art Unit: 2811

film 220 has a thin film thickness 221 that is less than about 20.0% of the critical dimension of the features in the devices. Nowhere in the specification states that thin films have thicknesses that are less than about 20.0% of critical dimension of features in devices.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 102(b) as being anticipated by Gnade et al. (PN 5,561,318, of record).

Gnade et al. discloses, as shown in the red-line Figure 7 cited in the previous Office Action, a structure comprising a multilayer stack of thin films (upper half portion 29, lower half portion 29), the thin films comprising a low-dielectric constant material, the thin films having pores, the thin film having the same porosity, the thin films having the same thickness, the thin films having thicknesses that are less than about 20.0% of critical dimension (CD) of features in devices (note that the examiner considers the critical dimension of features that includes layers 22, 24, 28 and 58. Therefore, according to the drawing, the layer 29 has a thickness that is less than about 20.0% of the thickness of critical dimension of features). Note that since claimed limitation of a multilayer stack of thin films, the thin film have same material characteristic and thickness, hence, thick layer 29 of Gnade et al. can be interpreted as consisting of a multilayer stack of thin films to form a thick layer, having same characteristics and thickness. Since the

Art Unit: 2811

claim is about the structure, at the final product, the multilayer stack of thin films is seen as one thick layer having same material characteristics throughout the entire stack of thin films.

With regard to claims 2, Gnade et al. discloses the low-dielectric constant material comprises an inorganic oxide (aerogel) [see Table].

With regard to claims 3, Gnade et al. discloses the inorganic oxide comprises aerogel which is Silicon Dioxide.

With regard to claims 4, Gnade et al. discloses thin films (27 and 29) have a porosity of 15 volume % to 50 volume % (within a range of below about 30.0 volume %) [see Figures 3C-3D and 4, Col. 3, lines 21-29, Col. 7, lines 19-23, and Col. 10, lines 23-30].

With regard to claims 5, Gnade et al. discloses pores are embedded within the thin films [see Figure 4].

With regard to claims 6, Gnade et al. discloses pores are unconnected [see Figure 4].

With regard to claims 7, Gnade et al. discloses pores have a size on the order of 2 nm to 25 nm (within the range of 0.3 – 3.0 nm) [see Col. 3, lines 59-62].

Art Unit: 2811

4. Claims 1-7 and 19-23, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 102(b) as being anticipated by Havemann et al. (PN 5,488,015, of record).

With regard to claim 1, Havemann et al. discloses, as shown in the red-line Figure 4C cited in the previous Office Action, a structure comprising a multilayer stack of thin films (upper half portion 36, lower half portion 36), the thin films comprising a low-dielectric constant material, the thin films having pores, the thin film having the same porosity, the thin films having the same thickness, the thin films having thicknesses that are less than about 20.0% of critical dimension (CD) of features in devices (note that the examiner considers the critical dimension of features has the thickness that includes layers 22, 24, 28, 30 and 38. Therefore, according to the drawing, the layer 36 has a thickness that is less than about 20.0% of the thickness of critical dimension of features). Note that since claimed limitation of a multilayer stack of thin films, the thin film have same material characteristic and thickness, hence, thick layer 36 of Havemann et al. can be interpreted as consisting of a multilayer stack of thin films to form a thick layer, having same characteristics and thickness. Since the claim is about the structure, at the final product, the multilayer stack of thin films is seen as one thick layer having same material characteristics throughout the entire stack of thin films.

With regard to claims 2, Havemann et al. discloses the low-dielectric constant material comprises an inorganic oxide (aerogel) [see Table].

With regard to claims 3, Havemann et al. discloses the inorganic oxide comprises aerogel which is Silicon Dioxide.

With regard to claims 4 and 20, Havemann et al. discloses thin films have a porosity of 30 volume % to 95 volume % (note that the claimed language states about 30.0 volume % which can be 30.1, 30.2, 30.3, etc.) [see Col. 3, lines 19-21].

With regard to claims 5 and 21, Havemann et al. discloses pores are embedded within the thin film [see Figure 4C].

With regard to claims 6 and 22, Havemann et al. discloses pores are unconnected [see Figure 4C].

With regard to claims 7 and 23, Havemann et al. discloses pores have a size between 2 nm to 25 nm (within the range of 0.3 – 3.0 nm) [see Col. 3, lines 17-19].

With regard to claim 19, Havemann et al. discloses, as shown in the red-line Figure 4C cited in the previous Office Action, a multilevel interconnect system comprising,

a first metal level (24) [AlCu, see Table];

a multilayer stack (upper half portion 36, lower half portion 36) disposed over the first metal level, the multilayer stack comprising:

thin films (upper half portion 36, lower half portion 36), the thin films having a low dielectric constant, the thin film having pores [see Table], the thin film having the same

Art Unit: 2811

porosity, the thin films having the same thickness, the thin films having thicknesses that are less than about 20.0% of critical dimension (CD) of features in devices;

a second metal level (not shown) disposed over the multilayer stack [see Col. 7, lines 33-36]. Note that Havemann et al. specifically states in the Table that the conductor can be a metal (note that the examiner considers the critical dimension of features has the thickness that includes layers 22, 24, 28, 30 and 38. Therefore, according to the drawing, the layer 36 has a thickness that is less than about 20.0% of the thickness of critical dimension of features). Note that since claimed limitation of a multilayer stack of thin films, the thin film have same material characteristic and thickness, hence, thick layer 36 of Havemann et al. can be interpreted as consisting of a multilayer stack of thin films to form a thick layer, having same characteristics and thickness. Since the claim is about the structure, at the final product, the multilayer stack of thin films is seen as one thick layer having same material characteristics throughout the entire stack of thin films.

### ***Response to Arguments***

5. Applicant's arguments filed 02/06/04 have been fully considered but they are not persuasive.

It is argued, at pages 5-7 of the Remarks, that Gnade et al. does not disclose all the limitations of amended claim 1. This argument is not convincing because Gnade et al. discloses, as shown in the red-line Figure 7 cited in the previous Office Action, a multilayer stack of thin films (upper half portion 29, lower half portion 29), the thin films comprising a low-dielectric constant material, having pores, having the same porosity, having the same thickness, and having



Art Unit: 2811

thicknesses that are less than about 20.0% of critical dimension (CD) of features in devices. The examiner considers the critical dimension of features that includes layers 22, 24, 28 and 58.

Therefore, according to the drawing, the layer 29 has a thickness that is less than about 20.0% of the thickness of critical dimension of features. Note that since claimed limitation of a multilayer stack of thin films, the thin film have same material characteristic and thickness, hence, thick layer 29 of Gnade et al. can be interpreted as consisting of a multilayer stack of thin films to form a thick layer, having same characteristics and thickness. Since the claim is about the structure, at the final product, the multilayer stack of thin films is seen as one thick layer having same material characteristics throughout the entire stack of thin films. Therefore, Applicants' claim 1 does not distinguish over the Gnade et al. reference.

It is argued, at pages 7-10 of the Remarks, that Havemann et al. does not disclose all the limitations of amended claims. This argument is not convincing because Havemann et al. discloses, as shown in the red-line Figure 4C cited in the previous Office Action, a multilayer stack of thin films (upper half portion 36, lower half portion 36), the thin films comprising a low-dielectric constant material, having pores, having the same porosity, having the same thickness, and having thicknesses that are less than about 20.0% of critical dimension (CD) of features in devices. The examiner considers the critical dimension of features has the thickness that includes layers 22, 24, 28, 30 and 38. Therefore, according to the drawing, the layer 36 has a thickness that is less than about 20.0% of the thickness of critical dimension of features. Since claimed limitation of a multilayer stack of thin films, the thin film have same material characteristic and thickness, hence, thick layer 36 of Havemann et al. can be interpreted as

consisting of a multilayer stack of thin films to form a thick layer, having same characteristics and thickness. Since the claim is about the structure, at the final product, the multilayer stack of thin films is seen as one thick layer having same material characteristics throughout the entire stack of thin films. Therefore, Applicants' claim 1 and 19 do not distinguish over the Havemann et al. reference.

***Conclusion***


6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (571) 272-1666. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The Central Fax Number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

August 23, 2004



Hung Vu

Patent Examiner